

REMARKS

Applicant appreciates the time taken by the Examiner to review Applicant's present application. This application has been carefully reviewed in light of the Official Action mailed March 8, 2006. Applicant respectfully requests reconsideration and favorable action in this case. Claim 9 is amended to correct a typographical error.

Rejections under 35 U.S.C. § 102

Claims 1-5, 7, 9, 12-14 and 19-23 stand rejected as anticipated by U.S. Patent No. 6,731,644 ("Epps"). Applicant respectfully submits that Epps does not anticipate Claims 1, 9 and 19 as Epps fails to teach i) duplication of header information and ii) making a routing decision for a frame prior to the frame reaching a head poison in a receive buffer based on header information in header storage.

Claims 1, 9, and 19 are Novel in Light of Epps.

Claim 1 of the present invention recites "storing the frames in a receive buffer," "storing header information corresponding to each of the frames in a header storage," and "prior to the first frame reaching a head position in the receive buffer, making a routing decision for delivering the first frame to its destination based upon the header information read from the header storage." From Claim 1, the header information in header storage must exist contemporaneously with the corresponding frame in the receive buffer for some period of time because the routing decision is made prior to the frame (not some a portion of the frame) reaching the head position. Consequently, it is implicit in Claim 1 that the header information is copied into header storage. See Specification, page 7, lines 8-22; page 11, lines 2-5; page 11, lines 21-24. This allows the frame to be routed without having to be rebuilt or otherwise made fit for transmission through reassembly.

Similarly, Claim 9 recites "a receive buffer configured to store a plurality of received frames," "a header storage configured to store header information," and "transfer logic coupled to the receive buffer and header storage, wherein the transfer logic is configured to make a routing decision for delivering each of the frames in the receive buffer to a destination based on the corresponding header information read from the header storage, the routing decision being

made prior to the corresponding frame reaching a head position in the receive buffer.” As in Claim 1, it is clear from Claim 9 as a whole that the header information is stored in the header storage at the same time that the corresponding frame is stored in the receive buffer so that the routing decision for the frame can be made from the header information in header storage before the frame reaches the head of the receive buffer.

Similar to Claims 1 and 9, Claim 19 recites “a receive buffer configured to store a plurality of frames,” “a header buffer configured to store header information,” and “transfer logic coupled to the receive buffer and the header buffer, wherein the transfer logic is configured to receive first header information from the header buffer and to make a routing decision based upon the received header information for a frame in the receive buffer corresponding to the header information, the routing decision being made before the frame reaches a head position in the receive buffer.” As in Claims 1 and 9, it is clear from Claim 19 as a whole that the header information is stored in the header storage at the same time that the corresponding frame is stored in the receive buffer so that the routing decision for the frame can be made from the header information in header storage before the frame reaches the head of the receive buffer.

Applicant respectfully submits that Claims 1, 9, and 19 differ from the teaching of Epps in a fundamental way: the frames stored in the frame receive buffer are complete frames which include the header information and are thus capable of being transmitted by a switch without having to be rebuilt. See Specification, page 13, lines 2-10. By contrast, Epps teaches removing a fixed n bytes from a packet. See Epps, col. 5, lines 50-55; col. 7, lines 5-10. In Epps, the fixed n bytes which contain the header information can be stored in one logical FIFO, while the remainders of the packets (referred to as tail portions in Epps), not the packets themselves, can be stored in a separate logical FIFO. See Epps, col. 5, lines 50-55; col. 7, lines 5-10. While the header and tail portions of Epps may stored in a single physical memory, this is very different from the claimed invention. The packet as a whole is not stored in the tail FIFO while the first n bytes are stored in header FIFO because, when the first n bytes “are separated from the packet”, only the remainder of the packet is stored the tail FIFO. See, Epps, col. 5, lines 42-50. Consequently, unlike the present invention according to Claims 1, 9 and 19, the packet must be reconstructed. See, Epps, col. 6, lines 60-65. Thus, Epps teaches storing a first n bytes in one logical FIFO and storing the tail portion of the a packet, not the packet itself, in the second logical FIFO, but does not teach storing frames in a receive buffer and storing header information corresponding to the frames in header storage at an overlapping

period of time as required by Claims 1, 9 and 19. As Epps does not teach Claims 1, 9 and 19 as a whole, Epps does not anticipate Claims 1, 9 and 19.

Furthermore, the Examiner relies on Epps to teach: “prior to the first frame reaching a head position in the receive buffer, making a routing decision for delivering the first frame.” The ability of the claimed invention to make a routing decision for a frame from header information for that frame read from the header storage allows, for example, a routing decision for the frame N+i (e.g., N+1) to be processed while frame N is being transmitted.

As an initial matter, Epps does not appear to provide a sufficient explanation of the timing between the processing of a first n bytes and a packet reaching the head of a receive buffer. There is nothing to indicate, for example, that the accumulated processing time within the pipelined switch of Epps is not so great that every tail is required to sit at the head of a buffer for some amount of time before the processing of the first n bytes is complete.

Furthermore, when the first n bytes of the packet in Epps are removed, the packet no longer exists as such in a particular FIFO because neither of the portions of the packet, whether it is the first n bytes or the “tail portion,” is the packet itself. In other words, there is no FIFO (logical or physical) that the packet can reach the head of once the first n bytes are removed as the packet itself is no longer in a particular FIFO. Consequently, in Epps, any routing decision made based on the first n bytes in the header FIFO is not being made prior to that packet reaching the head of the tail FIFO because the packet is not in the tail FIFO (i.e., only a portion of the packet is in the tail FIFO). Instead, the routing decision is being made for a packet that still needs to be assembled. See Epps, col. 5, lines 42-50. Thus, Epps does not teach or suggest, “prior to the first frame reaching a head position in the receive buffer, making a routing decision for delivering the first frame to its destination based upon the header information read from the header storage” as the packet for which the routing decision in Epps is being made is not yet assembled when the routing decision is made. Therefore, Applicant respectfully requests that the Examiner withdraw his rejection of Claims 1, 9 and 19.

Claims 4-5 are Novel in Light of Epps

Claim 4, as amended, recites “maintaining a timer corresponding to each header in the header storage that indicates how long the corresponding header has been in header storage” while Claim 5 recites “retrieving a timer corresponding to the retrieved header information, determining whether the timer corresponding to the retrieved header information exceeds a

predetermined maximum value, and discarding the frame corresponding to the header information if the timer corresponding to the retrieved header information exceeds the predetermined maximum value.”

According to Claim 4 a timer is associated with each header and determines how long that header has been in header storage. According to Claim 5, a frame corresponding to the header information is discarded if the timer exceeds a predetermined maximum value. Thus, the timer of the present invention is used to discard frames that have not been transmitted for an unduly long period of time.

The Examiner appears to cite the TTL of a packet as a timer corresponding to a header in header storage. Applicant respectfully submits, however, that a TTL field is not the same as a timer corresponding to header information in header storage. Instead, the TTL field within the packet is part of the upper layer protocol. The TTL field, as is understood in the art, is used to limit the amount of time (i.e, the number of hops) the packet can travel through the network before being dropped or returned. This prevents packets from living forever if they do not reach their destination. Epps, however, does not appear to maintain a timer corresponding to the first n bytes in the header FIFO to determine how long the n bytes were in the header FIFO. Applicant, therefore, respectfully requests allowance of Claim 4.

Moreover, while packets in Epps may be discarded based on the TTL field, as is common in network systems, there is nothing to suggest in Epps that the TTL field is used for anything other than its intended purpose: to limit the amount of hops the packet can make in the network. The TTL field is not used to limit the amount of time the first n bytes of a packet and the tail portion reside in their respective FIFOs. Thus, there is nothing to teach or suggest that a tail portion is discarded based on the amount of time the corresponding first n bytes have been in the header FIFO according to a timer corresponding to the first n bytes.

Rejections under 35 U.S.C. § 103

Claims 8 and 11

Claims 8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Epps.

Claim 8 recites “providing a bypass circuit coupled to the header storage, wherein if no header information is available at the head of the header storage, the bypass circuit makes next-received header information immediately available.” The Examiner admits that the recitations of Claim 8 are not shown by Epps. The Examiner then goes on to assert:

However Epps does teach that the switch is to operate as fast as possible (col. 3, lines 34-35). Epps also suggests that the packet is operated upon as soon as possible ("as the data arrives") (col. 6, lines 19-24). Therefore it would have been obvious to one of ordinary skill in the art to provide a bypass circuit coupled to the header storage, wherein if no header information is available at the head of the header storage the bypass circuit makes the next received header information immediately available in order to ensure a packet is processed as soon as possible.

The Examiner has failed to show any evidence that a bypass circuit according to Claim 8 would be obvious. The first reference to Epps in the rejection (col. 3, lines 34-35) simply teaches that the invention of Epps makes the switch fast, but does not suggest the use of a bypass circuit. The second reference to Epps in the rejection (col. 6, lines 19-24) simply suggests that something should happen when data arrives without indicating the use of a bypass switch. All the Examiner has done is pull out several general advantages and features of Epps—to make processing faster and operate on a packet as the data arrives—and concluded that a particular solution (i.e., the use of a bypass circuit) would be obvious to support the advantages or goals of the reference. Under the Examiner's reasoning, any solution that helps achieve the advantages or promotes the features of a reference would be obvious merely because that solution helps achieve the advantages or promote the features. Such a tautological analysis is fraught with hindsight as it relies solely on the teachings of the present application to provide the solution. As the Examiner has shown neither i) where "a bypass circuit coupled to the header storage, wherein if no header information is available at the head of the header storage, the bypass circuit makes next-received header information immediately available" can be found in the reference nor ii) sufficient motivation to modify Epps to achieve the present invention, the Examiner has failed to establish a prima facie case of obviousness. Therefore, Applicant respectfully requests allowance of Claim 8. For similar reasons, Applicant respectfully requests allowance of Claim 11.

Claims 15-18

Claims 15-18 stand rejected as being unpatentable over Epps in view of Kent (US 4,854,722).

Claim 15 recites “a plurality of timers associated with the each frame in the receive buffer, wherein each timer indicates the amount of time the corresponding frame has been in the receive buffer.”

The Examiner admits that Epps does not include the recitation of Claim 15, but states that “Kent teaches . . . using a plurality of timers associated with each frame in a buffer, wherein each timer indicates the amount of time the corresponding frame has been in the buffer in order to ensure that the buffer does not overflow (col. 16, lines 25-26).”

Kent, however, does not appear to teach a plurality of timers associated with the frame in the receive buffer. Instead, it appears that there is a single timer 154 to determine if a message (not a frame) has been in the FIFO too long. Moreover, it does not appear that the FIFO of Kent stores multiple messages, so there would be no need to provide a plurality of message timers to time the messages in the FIFO. Consequently, Kent does not teach “a plurality of timers associated with the each frame in the receive buffer, wherein each timer indicates the amount of time the corresponding frame has been in the receive buffer” and Applicant respectfully requests allowance of Claim 15 and 17.

Claim 16 recites “wherein the timers are promoted through the FIFO timer storage as the corresponding frames are promoted through the receive buffer.” Even assuming *arguendo* that Epps shows promotion of data through various FIFOs at the same rate, there is nothing to in Epps that teaches a timer in a FIFO timer storage that is promoted through the FIFO timer storage at the same rate as a corresponding frame. Moreover, there is nothing in Kent that teaches or suggests that the timer itself is in a FIFO timer storage and that the timer is promoted through the FIFO timer storage as a corresponding message is promoted through a FIFO. Thus, even if combined, there would be no motivation to promote the timer of Kent through a FIFO at the same rate as a corresponding message is promoted through a receive buffer.

CONCLUSION

Applicant respectfully requests that the Examiner withdraw his rejections of Claims 1, 9 and 19 and the respective dependant claims. Applicant has now made an earnest attempt to place this case in condition for allowance. Other than as explicitly set forth above, this reply does not include an acquiescence to statements, assertions, assumptions, conclusions, or any combination thereof in the Office Action. For the foregoing reasons and for other reasons clearly apparent, Applicant respectfully requests full allowance of the pending claims. The Examiner is invited to telephone the undersigned at the number listed below for prompt action in the event any issues remain.

The Director of the U.S. Patent and Trademark Office is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. 50-3183 of Sprinkle IP Law Group.

Respectfully submitted,

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